UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2005/2006

April-May 2006

RET 562 – Building Infrastructure
(Infrastruktur Bangunan)

Duration: 2 hours
(Masa: 2 jam)

(Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEMBILAN** muka surat yang tercetak sebelum anda memulakan peperiksaan ini.)
*Please check that this examination paper consists of **NINE** pages of printed material before you begin the examination.*

Jawab **EMPAT** soalan sahaja.
*Answer **FOUR** questions only.*

...2/-

1. Anda telah ditugaskan untuk menyediakan sistem pembetungan bagi satu pelan tatatur cadangan sebuah pembangunan institusi pengajian tinggi.

   (i) Bincangkan semua kriteria yang anda perlu pertimbangkan untuk memastikan pemilihan lokasi loji rawatan kumbahan yang sesuai.

   (ii) Bincangkan dengan bantuan lakaran, keperluan zon penampan untuk kawasan residensi, komersil dan industri bagi loji rawatan *kumbahan terbuka dan tertutup.*

(25 markah)

You have been assigned to prepare the sewerage system for a layout plan of a proposed institution of higher education development.

I) Describe all the criteria that you will have to consider in order to ensure the proper location selection of a sewage treatment plant.

II) Describe with the aid of sketches, the buffer zone for residential, commercial and industrial areas for open and enclosed sewage treatment plant.

(25 marks)

2. **Rajah 1** menunjukkan satu sistem saliran air permukaan utama bagi satu kawasan cadangan pembangunan di Georgetown. Data-data saluran disenaraikan dalam Jadual 1. Kira kadar aliran air larian yang dihasilkan di setiap perparitan. Gunakan jadual dan rumus yang dikepilkan. Buat andaian jika perlu. Guna Kaedah Rasional untuk pengiraan kadar alir kawasan tadahan.

***Figure 1** shows a surface water drainage for a proposed development in Georgetown. The drainage data is shown in **Table 1**. Calculate the surface runoff flowrate in all the drains. Use the table and formula given. Make assumptions if needed. Use the Rational Method for calculating the flowrate from the catchment areas given.*

...3/-

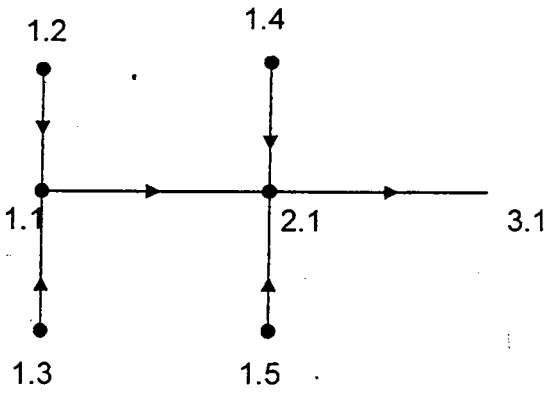

Figure 1
Rajah 1

Rumus
Formula

(i) $Q = C_s CiA$

Di sini,

Q - Kadar aliran air larian (kaki³/saat)
C_s - Pekali storan
C - Pekali air larian
i - Purata keamatan hujan (inci/jam)
A - Luas kawasan tadahan (ekar)

$Q = C_s CiA$

Where,

Q - Surface run off flow rate (ft³/sec.)
C_s - Storage coefficient
C - Surface run off coefficient
i - Average rainfall intensity (inch/hr.)
A - Area of catchment area (acres)

(ii) $t_c = t_o + t_d$

Di sini,

t_c - *Masa tumpuan (minit)*
t_o - *Masa aliran atas tanah (minit)*
t_d - *Masa aliran saliran (minit)*

$t_c = t_o + t_d$

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Where,

t_c - *Concentration time (min.)*
t_o - *Overland flow time (min.)*
t_d - *Drain flow time (min.)*

(iii) $C_s - \frac{2t_c}{2t_c + t_d}$

Di mana,

C_s - Pekali storan

$C_s - \frac{2t_c}{2t_c + t_d}$

Where,

C_s - Storage coefficient

(iv) *Halaju air*

Halaju hampir alur bagi cerun 1 – 2% adalah 2.0 kaki/saat

Stream velocity

Stream average velocity for slopes 1 – 2% is 2.0 feet/sec.

(v) Perulangan ribut

Gunà graf pulangan ribut sekali dalam 10 tahun.

Storm return period

Use 1:10 years return period.

(25 marks/*markah*)

....5/-

3 (a) Dengan bantuan lakaran, huraikan ciri utama kaedah tambak tanah berikut:

(i) Kaedah Parit
(ii) Kaedah Luas

(12 marks)

With the aid of sketches, highlight the main characteristics of the following method of landfills:

(i) Trench Method
(ii) Area Method

(12 marks)

(b) Kira keluasan tapak tambak tanah yang menerima sampah pepejal dari sebuah bandar yang mempunyai penduduk setara 20,000. Guna data berikut :

Kadar pengeluaran sampah	1.0 kg/orang/hari
Kepadatan isian	200 kg/m^3
Nisbah tanah/sampah	1:4
Had umur	10 tahun

(13 markah)

Calculate the area needed for a landfill site receiving solid waste from a city with 20,000 population equivalent. Use the following data :

Waste generation rate	*1.0 kg/person/day*
Bulk density	*200 kg/m^3*
Ratio soil/waste	*1:4*
Age limit	*10 years*

(13 marks)

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4. (a) Dengan bantuan lakaran, bincangkan bagaimana kolam tahanan mencegah banjir ?

(10 markah)

With the aid of sketches, discuss how retention ponds mitigate flood?

(10 marks)

(b) Rekabentuk diameter betung keratan bulat keluar satu kolam tahanan agar ianya menyalirkan air dengan kadar aliran 150 kaki³/saat. Guna *Rumus Manning.*

(15 markah)

Design the diameter of an outlet circular section culvert so as it can transfer 150 feet³/sec. of water from the retention pond. Use the Manning Formula.

(15 marks)

Rumus Manning

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

di sini,

Q - kadar aliran (kaki³/saat)
n - pekali kekasaran Manning (ambil guna n = 0.01)
A - luas keratan saliran (kaki²)
R - kedalaman min. hidraul (kaki²/kaki)
S - cerun (kaki/kaki) [s = 0.02]

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Manning Formula

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

where,

Q - Flow rate (feet³/sec.)
n - Manning's roughness coefficient (use n = 0.01)
A - Area of section (feet²)
R - Hidraulic mean depth (feet²/feet)
S - Slope (feet/feet) [s = 0.02]

5. Anda ditugaskan untuk merancang satu skim bekalan air untuk satu cadangan pembangunan residensi bercampur. Bincangkan langkah-langkah yang anda perlu ambil untuk menentukan sama ada tangki air menara diperlukan atau tidak.

(25 markah)

You are assigned to plan the water reticulation system of a proposed mixed residential development. Discuss the steps that you have to consider in order to decide wether an elevated water tower is needed or not.

(25 marks)

6. Anda telah ditugaskan untuk mengendalikan satu kajian ImpaK Alam Sekitar untuk satu cadangan pembangunan industri. Dengan bantuan carta alir proses , huraikan proses yang terlibat dalam penyediaan kajian tersebut..

(25 markah)

You are assigned to carry out an Environmental Impact Assessment (EIA) study for a proposed industrial development. With the aid of the process flowchart , discuss the processes involved in the preparation of the EIA .

(25 marks)

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(Use this Table for Question 2)
(Gunakan Jadual ini untuk Soalan 2)

Table 1: Calculation for Surface Runoff Flowrate
Jadual 1: Pengiraan Kadar Aliran Larian

Reference *Rujukan*	Area (acres) *Luas (ekar)*	Surface Run of Coefficient *Pekali Air Larian*	Equivalent Area (acres) *Luas Persamaan (ekar)*	Cumulative Area (acres) *Luas Kumulatif (ekar)*	Slope (feet/feet) *Cerun (kaki/kaki)*	Length of Drain (feet) *Panjang Saluran (kaki)*	t_d (minit)	t_o (minit)	t_c (minit)	C_s	I (inch/hour) *(inci/jam)*	Surface Runoff Flow Rate (feet³/saat) *Kadar Aliran Air Larian (kaki³/saat)*
1.2 – 1.1	12.0	0.8			1/120	700		15				
1.3 – 1.1	14.0	0.8			1/120	700		12				
1.1 – 2.1	11.0	0.7			1/120	800		12				
1.4 – 2.1	9.0	0.7			1/120	800		8				
1.5 – 2.1	8.0	0.7			1/120	500		5				
2.1 – 3.1	6.0	0.5			1/120	400		10				

(Use this Table for Question 2)
(Gunakan Jadual ini untuk Soalan 2)